REMARKS

Claims 1-46 are pending. Claims 1, 5, 6, 12, 17, 23, 24, 28, 33, 36, 39, and 44 have been amended to further move along the prosecution of this application. The specification has been amended to address the Examiner's concerns with respect to claims 2-4, and 13-15. Replacement drawings for Figures 1B, 2A, 4A and 4B are attached hereto. The remainder of the Examiner's objections to the drawings have been addressed by the amendments to the specification. No new matter has been introduced by these amendments.

Rejections under 35 USC 103(a)

Claims 1-15, 17-24, 26, 28-31, 33, 34, and 36-38 were rejected as being unpatentable over the articles by Sloan et al. and Purcell et al. In light of the amendments and the arguments contained herein, the Applicants respectfully request reconsideration of these rejections.

Independent claims 1, 6, 12, 17, 23, 28, 33, and 36 have been amended. More specifically, claim 1 includes the feature of determining an approximation of a transfer function component using at least one basis function, the approximation corresponding to a center point of a texel associated with a corresponding point on the display object. Applicants respectfully submit that neither Sloan nor Purcell teach this feature. In fact Purcell is restricted to the use of triangles (see Figures 2 and 4). Sloan mentions storing the transfer functions in texture maps in section 6, however, the feature of claim 1, as amended, is not taught in this section of Sloan. Claims 2-5 are dependent from claim 1

and therefore allowable for at least these reasons. Additionally, claim 5 has been amended to include the feature of repeating the determining of an approximation of a transfer function component for a series of basis functions without accessing a pre-calculated geometry associated with the object. As stated in the application on page 25, lines 1-4. Purcell requires that the scene geometry is stored as triangles within a data structure (see page 705, section 3). Thus, Purcell requires that numerous tables and data structures be generated for the stream processing. Furthermore, Purcell states that the algorithm described herein may not be efficient for dynamic scenes, where the present application is ideally suited for dynamic scenes as a result of being able to approximate the transfer function and not having to calculate all the triangles required by Purcell. Accordingly, the Applicants respectfully submit that one skilled in the art would not have combined Sloan and Purcell as suggested by the Examiner as Purcell requires the data structures and Purcell explicitly states that stream processing embodiments are not efficient for dynamic scenes. Applicants respectfully request that the Examiner elaborate how one skilled in the art would disregard this teaching of Purcell and specify the motivation to combine Sloan and Purcell.

Claim 12 includes the feature of program instructions for determining an approximation of a transfer function component using at least one basis function, the approximation corresponding to a center point of a texel associated with a corresponding point on the display object. Claim 12 is patentable over the cited references for at least the reasons stated above for claim 1. Claims 13-16 depend from claim 12 and are likewise patentable over the cited references.

Claims 6 and 17 include the feature of generating a ray from a point on the object without accessing pre-calculated geometry associated with the object. As stated within the present application, the preprocessing operations are eliminated and the calculations are performed in real time without the need to access any pre-calculated geometry (see figures 14 and 15 and corresponding text). As acknowledged by the Examiner, Sloan is silent as to ray tracing. Purcell discusses ray tracing, however, Purcell requires the use of pre-calculated geometries and pre-processed data structures as mentioned above. Accordingly, claims 6 and 17, and dependent claims 7-11, and 18-22, respectively, are patentable over the cited combination.

Claim 23 includes the feature of applying a ray tracing algorithm through a stream processor without accessing pre-calculated geometry associated with the object. As mentioned above with reference to claims 6 and 17, Purcell teaches away from this feature by requiring that pre-calculated geometries be accessible and data structures for the stream processing are built. Accordingly, claim 23, and dependent claims 24-27 are patentable over the cited combination.

Applicants would like to further point out that claim 24 has been amended to specify that the multiply and add operations are performed without the need to calculate the lighting function at triangle corners. Purcell requires the calculation of the lighting function at the triangle corners to be used with the stream processing (see section 3). As acknowledged by the Examiner, Sloan does not teach the multiply and add operations. Therefore, claim 24 includes additional features not taught or disclosed by Sloan or Purcell.

Claims 28 and 36 have been amended to include the feature of calculating a transfer function approximation of the lighting function through a stream processor, the lighting function being sampled at a center of a texel. As mentioned above with regard to claim 1, neither Sloan nor Purcell teach this feature. Accordingly, claims 28 and 36, and dependent claims 29-32 and 37-38, respectively are patentable over the cited combination.

Claim 33 includes the feature of program instruction for applying a ray tracing algorithm through a stream processor without accessing pre-calculated geometry associated with the object. As mentioned above with reference to claims 6 and 17, Purcell teaches away from this feature by requiring that pre-calculated geometries be accessible and data structures for the stream processing are built. Accordingly, claim 33, and dependent claims 34-35 are patentable over the cited combination.

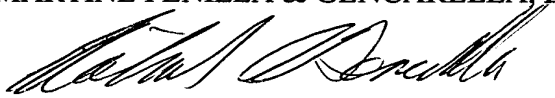
Claim 39 was rejected as being unpatentable over US Patent No. 6,639,595 to Drebin et al., in view of Sloan and further in view of Purcell. Claim 39 includes the feature of a graphics processing unit (GPU) capable of determining lighting characteristics for an object in real time without accessing pre-calculated geometry associated with the object. As discussed above with reference to claims 6 and 17, Purcell teaches away from this feature by requiring that pre-calculated geometries be accessible and data structures for the stream processing are built. Drebin and Sloan do nothing to cure this deficiency. Drebin also utilizes triangle calculations (see Figures 12-20). Accordingly, claim 39, and dependent claims 40-46 are patentable over the cited combination. Claim 44 has also been amended to specify that the ray tracing algorithm determines a direct illumination lighting characteristic in real time for multiple points on

the object and the multiply and add operation determine a secondary lighting characteristic in real time without calculating the lighting function at triangle corners. As mentioned above, Purcell teaches using the pre-calculated triangle geometry with the stream processing for non-dynamic scenes.

Applicants would like to further point out that the additionally cited references, namely, Cook, Bonello, and Moller, do not cure the above specified deficiencies of the combination of Sloan and Purcell, with or without Drebin.

In view of the foregoing, Applicants respectfully submit that all of the pending claims are in condition for allowance. A notice of allowance is respectfully requested. In the event a telephone conversation would expedite the prosecution of this application, the Examiner may reach the undersigned at **(408) 774-6921**. If any fees are due in connection with the filing of this paper, then the Commissioner is authorized to charge such fees to Deposit Account No. 50-0805 (Order No. SONYP024). A copy of the transmittal is enclosed for this purpose.

Respectfully submitted,
MARTINE PENILLA & GENCARELLA, LLP



Michael L. Gencarella
Registration No. 44,703

710 Lakeway Drive, Suite 200
Sunnyvale, California 94085
Telephone: (408) 749-6900
Customer No. 25920